KNOWLEDGE-BASED SYSTEMS(KBS) DEVELOPMENT STANDARDS A MAINTENANCE PERSPECTIVE

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OVERVIEW

- PURPOSE
- KNOWLEDGE-BASED SYSTEMS PERSPECTIVE
- CONVENTIONAL COMPUTING/SOFTWARE EXPERIENCE
- KBS STANDARDIZATION
- SUMMARY

PURPOSE

- IDENTIFY KBS STANDARDIZATION NEEDS/ISSUES RELATED TO SUPPORT OF KNOWLEDGE-BASED SYSTEMS

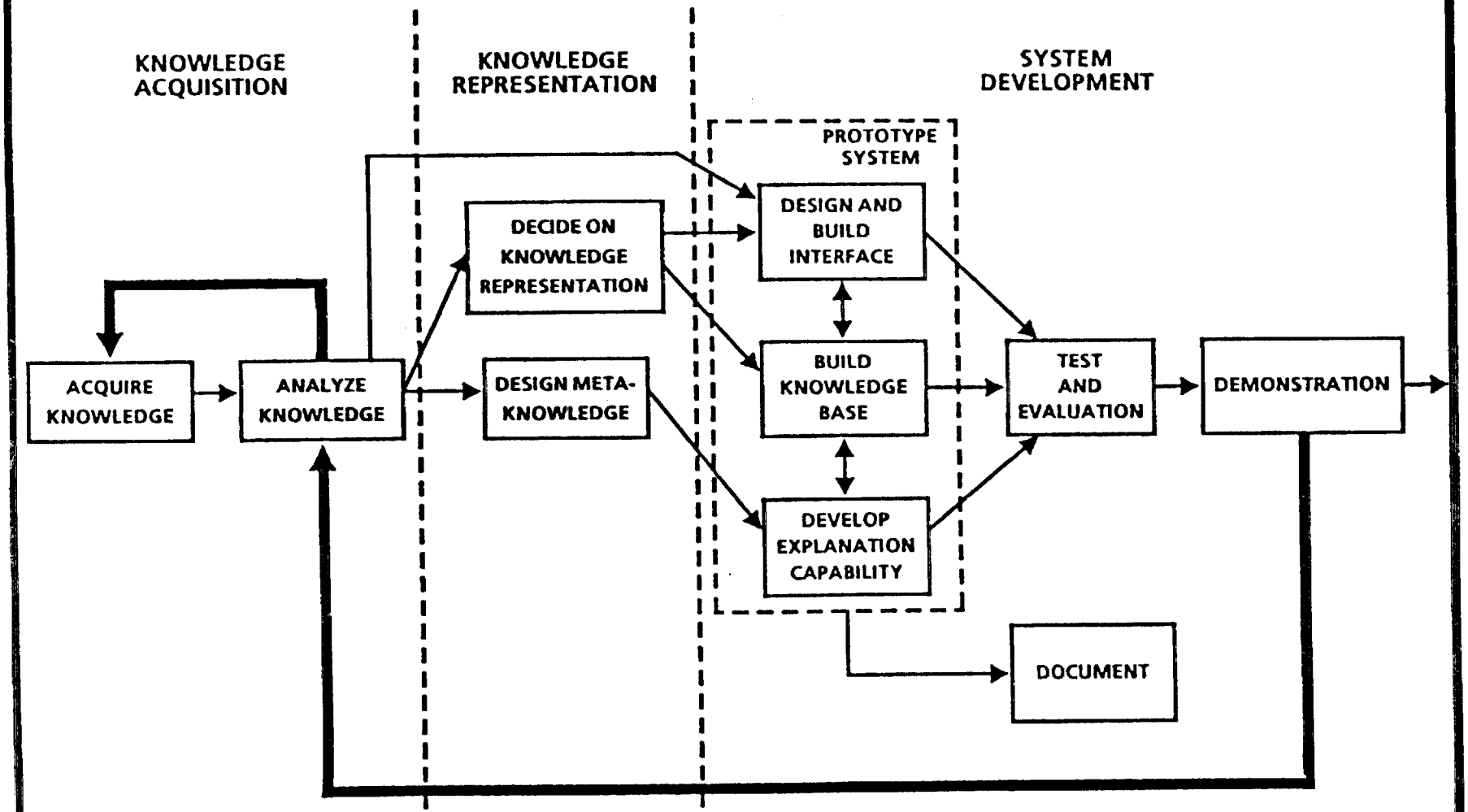
KNOWLEDGE-BASED SYSTEMS PERSPECTIVE

KBS GENERALIZES APPLICATION OF COMPUTING/SOFTWARE IN SYSTEMS

- Broader class of problems is addressed vs traditional efforts
- Non-algorithmic solutions are made practical
- Higher-order language/representation provide better user interface

...Capabilities which must be supported

KNOWLEDGE ENGINEERING PROCESS



KNOWLEDGE-BASED SYSTEMS PERSPECTIVE (CONT'D)

KBS CAPABILITIES OF GREATEST INTEREST TO AFLC

- Improved consistency in decision making
- Force status, readiness, and system recovery
- Support/maintenance automation for major systems
- Inspection, diagnosis, and repair assistance
- Inventory, supply and distribution tracking
- Automated document generation/update/delivery
- Management system database streamlining

...KBS is central to improved support systems

KNOWLEDGE-BASED SYSTEMS PERSPECTIVE (CONT'D)

KBS PRESERVES FLEXIBILITY TO REFINE APPLICATIONS

- Emphasizes ongoing refinement of mission processes and criteria
- Drives clean engineering practice, e.g. separation of control, processes, knowledge and special purpose modules

...KBS expand the scope of support to include continued refinement of mission tasks and knowledge bases

KNOWLEDGE-BASED SYSTEMS PERSPECTIVE (CONT'D)

MAJOR SYSTEM SUPPORT/KBS APPLICATIONS

- Supportability
- Support System Design

IMPROVEMENT TO FIELDED SYSTEMS

- Post Deployment Modification
- Life Cycle Support Environments

ORGANIZATIONAL INFRASTRUCUTRE

- Data Systems
- Task Automation

...Standards approach should recognize similarities, differences

KBS SUPPORT - WHAT'S DIFFERENT?

- CONTINUED UPDATE/REFINEMENT OF KNOWLEDGE BASES
- SUPPORT OF NEW HIGH-LEVEL DESCRIPTION LANGUAGES
- NON-TRADITIONAL SYSTEM CONFIGURATIONS
- MORE COMPLICATED POTENTIAL FAILURE PROPERTIES

CONVENTIONAL COMPUTING/SOFTWARE EXPERIENCE

- POLICY - AFR 800-xx, AFR 700-xx
- WORKING GROUPS - CRWG, IMWG
- LIFE CYCLE PLANNING
- PHASED ACQUISITION CRITERIA

CONVENTIONAL COMPUTING/SOFTWARE EXPERIENCE

TECHNICAL STANDARDS/GUIDES

- Process
- Architecture
- Baseline Management/CM
- Quality Eval
- Languages
- Risk Assessment
- Environments
- Requirements Screeening

...Software support treated as routine CM and modification separate from hardware and system engineering

CONVENTIONAL COMPUTING/SOFTWARE EXPERIENCE (CONT'D)

AREAS WEAKLY ADDRESSED IN CONVENTIONAL APPROACH

- Support Process and Support Analysis
- System Engineering and Integration
- Network/Integrated-System Baselines and Command/Control Engineering

...KBS will encounter the same problems unless we do something about it

SUPPORTABILITY PROGRAM REQUIREMENTS

- OPERATIONAL REQUIREMENTS, CRITERIA MUST INCLUDE (AF)
- COORDINATE SUPPORT CONCEPT BEFORE MSII (AF)
- COMPUTER RESOURCES SUPPORT AN ELEMENT OF ILS (DOD)
- INTEGRATE AF ILS FOR SDI (SDIO, AF)
- MCCR LIFE CYCLE PLAN, SIGNED BEFORE MS II (DOD)
- SUPPORTABILITY A CO-EQUAL ACQUISITION PRIORITY (DOD)
- USE CENTRALIZED INTEGRATION SUPPORT (MAJCOMS)
- ACQUIRE AND DELIVER SUPPORT CAPABILITY FOR BLUE-SUIT (AF)
- PROVIDE SUPPORTABILITY ASSESSMENT/PROGRAM REVIEWS (AF)
- SUPPORTABILITY R&D INCLUDING SOFTWARE (SDIO)

(Network role not uniformly addressed in P&G)

SUPPORTABILITY PROGRAM TASKS
AFR 800-8, 800-14, AFLC/AFSCP 800-34

- SUPPORTABILITY PROGRAM MANAGEMENT
  - PLANNING (CRLCMP) AND COORDINATION (CRWG)
  - PROGRAM/TECHNICAL REVIEWS & STATUS/RISK ASSESSMENT
- DEFINE SUPPORTABILITY OBJECTIVES, CRITERIA, & CONSTRAINTS
  - ARRIVE AT SOUND ENGINEERING DEFINITION OF BASELINES AND TESTABLE SUPPORTABILITY CRITERIA
- SUPPORTABILITY COVERAGE IN TECHNICAL REQUIREMENTS & TRADES
  - ENGINEERING INTEGRITY OF MISSION/SYSTEM BASELINE
- SUPPORTABILITY IN ACQUISITION REQUIREMENTS
  - ACQUIRE AND DELIVER SUPPORT CAPABILITY FOR BLUE SUIT OPS. AND POST DEPLOYMENT SUPPORT, FOR ALL SUPPORT PROCESSES
- LIFE CYCLE SUPPORT RESOURCES/LCC
  - IDENTIFY POST-ACQUISTION AND TOTAL RESOURCE REQMTS AND DRIVERS, E.G. SUPPORT CYCLES, TASKS, SKILLS, LOADS
- SUPPORTABILITY EVALUATION AND FEEDBACK
  - THRU EACH ACQUISITION/LIFE CYCLE PHASE

-- BASELINE DEFINITION & EVALUATION IS CENTRAL

CHRONIC PROBLEM AREAS

- Support of burgeoning software/hardware inventory
- Poor requirements definition and traceability
- Underscoped costing, sizing, and risk assessment
- Integration problems and underscoping of size and effort in large systems/networks
- Incompatibilities of multiple languages, methods, conventions, and environments

...KBS, as a further expansion of 'software' role in systems, may be a lot tougher support problem than past software

KBS STANDARDIZATION

REASONS FOR KBS STANDARDS/GUIDELINES

- Simplify post-deployment support needs/structure
- Prevent unneeded proliferation of KBS products
- Ensure technical integrity of KBS applications/interfaces
- Prevent unproductive differences in baseline management, methods, and support strategies

KBS STANDARDIZATION

CRITICAL KBS STANDARDIZATION NEEDS

- KBS requirements definition and management in systems
- KBS costing, sizing, and risk assessment in systems
- KBS coverage in procurement definition/review
- KBS evaluation/verification/certification including criteria for supportable KBS
- KBS life cycle integration in systems (with conventional computing/software)

KBS STANDARDIZATION

Standards which span all life cycle phases

- High-level conventions/languages for KBS and systems
- KBS support process in systems
- KBS supportability tasks, criteria including LSA/support analysis
- Selection criteria for KBS tools, environments

KBS STANDARDIZATION ISSUES

- KBS PROLIFERATION IN ABSENCE OF STANDARDS
- EXISTING COMPUTING/SOFTWARE STANDARDS ADEQUACY
- SYSTEM INTEGRATION OF KBS
  - Impacts to performance, fault response, support requirements
  - Transition from legacy software or non-standard KBS
- SUPPORT PROCESS/KBS IN LOGISTICS STANDARDS
- KBS/OTHER ENGINEERING DISCIPLINES INTERFACE AND INITIATIVES - CIM/CASE, CALS, LSA,
- PARALLEL PROCESSING, ADA, etc.

SUMMARY

- KBS involves broader scope of concern than traditional computing/software
- Chronic problems for conventional computing promise to be even more difficult for KBS
- Standardization is essential to practically use KBS for defense systems
- Support-related issues and needs have been identified